The assumption underlying these deletions is that the phenomenon of incomplete reporting is not related to the behavior of the variables used in the analysis. Separate analyses showed little correlation of hospital characteristics such as ownership, size, and levels of cost with variables such as expenditure growth (see below).

The AHA approach of assigning the average values of similar hospitals to hospitals with missing data was not used because it would artificially shrink the distributions. This would have invalidated hospital cost containment savings estimates, which are sensitive to the shapes of key distributions.

Fourth, hospitals exhibiting highly unusual behavior were dropped. For example, hospitals whose expenditures per adjusted admission increased by more than 100 percent or decreased by more than 50 percent in any year were excluded. Roughly 2 percent of all hospitals were dropped at this point because of such suspicious data.

The assumption underlying this screen was that hospitals reporting changes so extreme were likely to have made errors in reporting. To the extent these changes actually occurred, the hospitals would be likely candidates for exceptions. Undoubtedly, some hospitals were dropped whose unusual behavior was due to changes such as mergers or the opening or closing of substantial numbers of beds. To the extent that not all of these shifts reflect errors and that these hospitals would not receive exceptions, the process of eliminating outlier hospitals may have distorted the shape of the distribution of hospital expenditure increases. This, in turn, may have reduced estimates of savings. On the other hand, some hospitals that were not eliminated, such as hospitals with 95 percent increases in expenditures per adjusted admission, may have been erroneously reporting unusual

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4. The simulation also used data for 1972, but looser standards were applied because the 1978 experience that it was used to simulate was only of minor importance for estimating the effects of the legislation.

5. This screen also indirectly eliminated new hospitals as specified in the legislation.

behavior. This would have introduced an opposite bias to the savings estimates. The net effect on the savings estimates is not known.

The hospitals remaining at this point (about 42 percent of all hospitals) were used in the aging process (see next section). Thirty-one percent of all hospitals were eliminated by the legislation, and 27 percent by CBO screens.

Finally, small rural hospitals (which were excluded by the legislation) were dropped. These 17 percent of the hospitals were eliminated after the aging process because they were included in the current policy forecasts.

After all the screens had been applied, about 25 percent of the hospitals were used in the simulation, and 75 percent were not. The legislation eliminated 48 percent of all the hospitals, and 27 percent were eliminated by CBO screens. Of the hospitals not eliminated by the legislation, 52 percent were used in the simulation.

Aging the Files

The Method Used. Data from individual hospitals from 1972 through 1977 were aged so that they simulated the same hospital population for the period 1978 through 1983. The aging algorithm "shifted" each data point ahead six years using the aggregate current policy forecasts. Thus for example, 1974 historical data were aged to simulate 1980. The variables that were aged included total expenditures, adjusted admissions, wage rates, and the wage/nonwage input mix. The aging algorithm was modified to include a data smoothing process which allowed distributional analysis of the savings estimates.

For each hospital, levels of variables in each projected year were determined by applying the ratio of the aggregate value of that variable in the projected year to the aggregate value in the relevant historical year to the individual hospital level in the historical year, as in (1).

$$(1) \qquad e'_{it} = e_{i,t-a} \times \frac{E_t}{\sum_i e_{i,t-a}}$$

where

e_{it} = total hospital expenditures for hospital i in year t.

e'_{it} = simulated total hospital expenditures for hospital i in year t.

E_t = projected aggregate hospital expenditures in year t.

a = number of years to age the data (in this case a = 6).

For example, since the increase in aggregate hospital expenditures between 1976 and 1982 was projected to be 140 percent, each hospital's 1982 expenditures were projected to be 140 percent of its 1976 level.[6] This process results in the ratio of a hospital's expenditures to the aggregate expenditure level for a simulated year being set equal to the actual ratio six years earlier. For example, if a hospital's expenditures equalled .00137 of total hospital expenditures in 1976, its projected expenditures for 1982 would equal .00137 of total hospital expenditures projected for 1982. Also, the ratio of the increase in a hospital's expenditures to the increase in aggregate expenditures between any two simulated years was left equal to the actual ratio six years earlier as in (2).

$$(2) \qquad \frac{\left[\frac{e'_{it}}{e'_{i,t-1}}\right]}{\left[\frac{E_t}{E_{t-1}}\right]} = \frac{\left[\frac{e_{i,t-a}}{e_{i,t-a-1}}\right]}{\left[\frac{\sum_i e_{i,t-a}}{\sum_i e_{i,t-a-1}}\right]}$$

6. Recall that this projection was for hospitals in states without their own cost control programs.

For example, if a hospital's ratio of 1976 expenditures to 1975 expenditures was 110 percent of the national average for those years, its ratio of 1982 expenditures to 1981 expenditures would be 110 percent of the projected national average ratio for those projected years. The same process was applied to each variable (for example, wages, admissions) for each year.[7]

The result of the aging process was a simulated file of hospital behavior for 1978 through 1983. For each hospital, there were simulated values for expenditures, adjusted admissions, wage/nonwage factor mix, and wages for 1978 through 1983. Similarly, there were simulated rates of change for these variables for that time period.

The goal of the aging process is a reasonably accurate joint distribution of levels and rates of change of variables for individual hospitals. No connection is intended, however, between any specific hospital's historical data and its projected data. For example, if hospital A had a low level of expenditures per patient day in 1974 but a high rate of increase in total expenditures from 1974 to 1975, the aging process would simulate a hospital with low per diem expenditures in 1980 but a high rate of increase in total expenditures from 1980 to 1981. Nevertheless, the model does not imply that the simulated hospital with that performance is in fact hospital A. While the model attempts to simulate distributions of levels and rates of change of the variables of interest, no linkage between specific individual hospitals in the simulated data and those in the historical data is attempted.

A refinement to the aging process was necessary in order to analyze more accurately the relative effects of the legislation on different types of hospitals (for example, large public, or small

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7. The macroeconomic aging process was applied to the means of hospitals remaining in the population after screening the data, so that dropping hospitals with incomplete or outlier data had no effect on the effect of the macro controls on individual hospital values. Small rural hospitals were dropped after the aging was completed, however, because there was insufficient data to forecast hospital aggregates excluding them.

investor-owned). Although the behavior of any one group of hospitals may be quite similar to the behavior of the hospital population as a whole in the long run, it still may differ significantly from the average in any one year. A process was designed to smooth the data to eliminate these random fluctuations, so that the choice of 1972 instead of 1973, for instance, to simulate 1978, would not be prejudicial to any single type of hospitals.[8]

As in the basic part of the aging process, this smoothing adjustment involved inflating each hospital's value of a variable by a constant group multiplier for that year. The group multipliers for each year were computed as the ratio of the simple means of each variable averaged over time for each group to the variable's mean for the group in the given year, as in (3).

$$(3) \qquad S_{gt} = \frac{\frac{1}{k}\sum_{t}\left(\frac{1}{n_g}\sum_{i} e_{git}\right)}{\frac{1}{n_g}\sum_{i} e_{git}}$$

where

S_{gt} = smoothing multiplier for group g in year t.

e_{git} = total expenditures in year t for hospital i in group g.

n_g = number of hospitals in group g.

k = number of years of survey data summed (in this case k = 6).

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8. When hospitals were grouped into cells according to ownership and size, regressing individual annual hospital expenditure growth over the 1976-1977 period on dummy variables for each cell showed hospital group to be a poor predictor of hospitals' time-series behavior. There were, however, substantial differences between the behavior of different hospital groups in any one-year time period.

This multiplier was used to modify the basic aging equation (1) to produce the final aging equation (4).

$$(4) \qquad e'_{git} = e_{g,i,t-a} \times \frac{E_t}{\sum_g \sum_i (S_{g,t-a} \times e_{g,i,t-a})} \times S_{g,t-a}$$

The smoothing process eliminated year-to-year variations in relative changes of the simulated variables in each group while preserving the long-term relationships between hospital groups. In general these adjustments had only small effects on the final relative values of different hospital groups.

SIMULATING THE PROPOSAL

After the data base was aged, the next step involved simulating the proposal. For each hospital, simulated guidelines were compared to simulated expenditure increases. For each hospital that exceeded its guideline, revenue limits were simulated and savings calculated.

Simulating the Guidelines and Their Effects

Guidelines were determined for each hospital according to the formulas specified in the legislation. Once calculated, they were compared to the simulated rate of increase in expenditures for each hospital.

The guidelines were combinations of the percentage increase in a national input price index, hospitals' percentage increases in the wage rates of nonsupervisory personnel, and the percentage increases in state populations. The wage rate increases simulated by the aging process were used to calculate the guidelines, as were the simulated payroll/nonpayroll factor mixes.[9]

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9. A rather complex reporting period adjustment process specified in the legislation was also incorporated, but it is not discussed here. See CBO, Controlling Rising Hospital Costs.

The guidelines were used to determine, for each year, which hospitals would be subject to mandatory revenue controls in succeeding years and which hospitals should be reexamined the following year. Once each hospital's guideline was calculated for a year, it was subtracted from the hospital's simulated expenditure change. The difference was multiplied by the hospital's expenditure level in the preceeding year. These amounts were summed over all hospitals in a state. If the sum was negative, then the state was judged to have met its guideline, and all hospitals in the state were placed in a pool to be reexamined the next year. If the state guideline was exceeded, then those individual hospitals exceeding their guidelines were placed in a pool that would be subject to controls in the following year. Those hospitals meeting their guidelines were placed in the pool to be reexamined in the following year.

This guideline evaluation process identified those hospitals subject to controls in the following years. The simulation process provided insight into the toughness of the guideline. Information on the average guidelines faced by hospitals not exempted from the controls was generated as were data on the proportion of hospitals exceeding their guidelines (see Chapter IV).

Calculating the Revenue Limits

Limits on revenues per admission were calculated for those hospitals exceeding their guidelines the previous year. The per admission revenue limits were computed from each hospital's simulated wage rate increase, the projected increase in national input prices, a penalty based on the hospital's simulated performance under the guidelines, and the hospital's simulated revenue per admission during the year in which the hospital exceeded its voluntary guideline. Adjustments for relatively efficient and inefficient hospitals called for in the bill were made on the basis of an efficiency formula provided by HHS.[10]

A total dollar limit on each hospital's revenue was computed by multiplying its revenue per admission limit by its deemed admissions level. This value was computed from the hospital's

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10. Medicare data on routine costs were used in determining the efficiency adjustment.

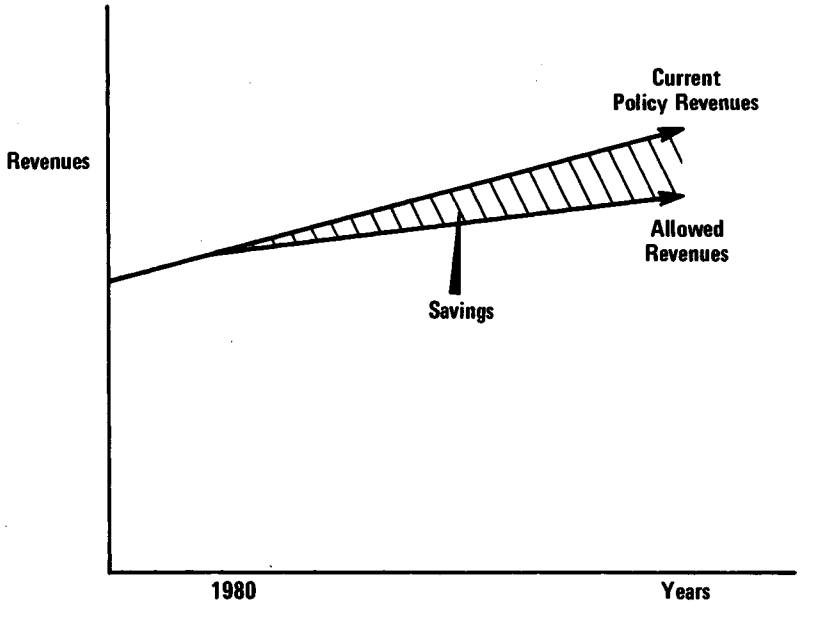
actual admissions level in the previous year and the hospital's percent change in admissions according to a formula assumed by HHS staff (see Chapter I).

Applying the Revenue Limits

The savings were calculated by summing the differences between each hospital's simulated current policy revenues and those simulated to be allowed under the legislation (see Figure 1). For example, if a hospital's revenues were $1.00 million in 1980, and if they would increase by 15 percent to $1.15 million under current policy, a 12 percent revenue limit would result in $0.03 million savings ($1.15 minus $1.12 million). Total savings were determined by summing the individual hospital savings. The estimates were based on the assumption that no hospital would change its behavior from current policy unless it was forced to do so by imposition of a mandatory limit. In this case, a hospital was assumed to spend the maximum allowed by the limit. These assumptions are discussed in detail below in Chapter IV.

Figure 1.

Effect of Cost Containment Legislation on a Hypothetical Hospital



Calculating the Savings to Purchasers of Hospital Care

Four steps were necessary to determine savings to the federal government from reduced outlays for Medicare and Medicaid for each fiscal year. First, savings for each hospital's own reporting period were estimated.[11] Second, the savings were evenly divided between quarters in each hospital's reporting year. Third, the savings per quarter were aggregated to federal fiscal year totals (October-September). Fourth, the federal fiscal year savings were adjusted to allow for time lags between when savings would accrue and when they would appear as reductions in federal outlays. Savings were computed separately for Medicare and other payers to take into account the relatively higher growth rate, and the resulting more stringent limits, of Medicare revenues per admission.[12]

CBO usually provides savings estimates for the five-year period following enactment of bills.[13] This presented a problem because the six years of micro-data could only be aged to simulate the 1978 to 1983 period.[14] Therefore, a different procedure was

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11. Whenever information about Medicare reporting periods was available, these dates were used in the analysis instead of the AHA reporting dates. Data were adjusted accordingly to reflect the difference between Medicare and AHA reporting periods.

12. The legislation specified applying revenue limits separately to each class of payers.

13. Although the legislation specifies guidelines starting in 1979, the CBO simulation summarized here, a reestimate of an earlier simulation, starts the guidelines in 1980 due to the stalled progress of the bill through the Congress. Savings estimates were therefore required for fiscal years 1981 through 1985.

14. Simulating the proposal required 1978 data because the legislation specified adjustments to the guidelines for hospitals with 1980 reporting periods starting before January 1. These adjustments were based on the 1978-79 rate of change of total expenditures for each hospital.

developed to simulate hospital behavior in 1984 and 1985. Fortunately, the need for microdata for those years was slight. By 1984, virtually all hospitals were projected to be subject to mandatory controls, so the inability to measure guideline compliance was of minor consequence.[15] For each hospital projected to be subject to mandatory controls in 1984, current policy inpatient revenues per admission and other variables for 1984 and 1985 were projected to increase at a rate which deviated from the national increase by the same margin as in 1983. This preserved the 1983 distributions of these variables.

The estimate of savings should have been reduced to reflect the exceptions process included in the legislation. The bill, however, did not specify conditions for exceptions, making it impossible to estimate the magnitude of their effect.[16] A decision was made to label the savings estimate as probably too high rather than speculate about the size of the reduction from the exceptions process.

Another question not addressed by the model is how much of the savings would come from expenditure reductions rather than from reduced surpluses or increased deficits. Ultimately, all savings should reflect expenditure reductions, but hospitals may defer such reductions for years by slowing capital accumulation. An estimate of the proportion of savings achieved by expenditure reduction would be useful for assessing the impact of the legislation on inflation as well as its possible effect on the quality of care.

The absence of much research on the issue of how rapidly hospitals can cut costs in response to controls on revenues discouraged examination of this issue. While there is some evidence that the Economic Stabilization Program (ESP) and New York State's control program affected revenues more than costs,

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15. The simulation projected that only 2 percent of the hospitals would have met their guideline each year at this point.

16. The bills reported by the committees specified some of the conditions necessary for exception, but offered no clear-cut rules. Financial hardship was emphasized, but the data base lacked adequate information from hospital balance sheets to determine which hospitals were in financial difficulty.

inference from these experiences is inappropriate.[17] Expectations that controls would be temporary makes ESP a poor prototype for this question, while New York State's program has important differences from the Hospital Cost Containment Act of 1979.

The model assumes that hospitals would not alter their behavior in response to the controls except to comply with the revenue ceilings. This, of course, would not be the case. Alternative assumptions about hospital behavior are discussed in Chapter IV in the section on sensitivity analyses.

ALTERNATIVE SIMULATION METHODS

The aging process differs considerably from other forms of microsimulation, which usually involve the application of a set of behavioral equations to each unit of a microdata file. The equations may be of several sorts: regression models estimated from historical data, simple inflation equations, probability models using random number generators, or merely the mathematical expression of theoretical or pragmatic assumptions. Usually these equations, once specified, are applied repetitively to a single cross-sectional microdata file to project future changes.

Estimation of behavioral equations with regression models was rejected because of the inability to predict individual hospital variations over time with any accuracy. The rates of change of various expenditure and admissions variables for individual hospitals (standardized for the aggregate annual rate of change) were regressed on various combinations of independent variables such as hospital ownership, hospital size (number of beds), medical school affiliation, and urban location and the lagged dependent variable.

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17. See Paul B. Ginsburg, "Impact of the Economic Stabilization Program on Hospitals: An Analysis with Aggregate Data," in Michael Zubkoff, Ira E. Raskin, and Ruth S. Hanft, eds., Hospital Cost Containment: Selected Notes for Future Policy (Milbank Memorial Fund, 1978), pp. 293-323, and Abt Associates, Inc., Analysis of Prospective Payment Systems, Prepared for the Office of Research and Statistics, Department of Health, Education, and Welfare, HEW-OS-74-261 (April 6, 1976).

Even when lags of up to four time periods were employed, none of the regressions explained more than 2 percent of the variation in the dependent variables. Given the need to predict the distribution of individual rather than mean hospital behavior, a regression explaining less than 2 percent of individual hospital variation would have been inadequate.

This apparently random behavior in individual hospital annual rates of change is demonstrated more graphically by simple correlation coefficients (see Table 3). For example, the correlation between the rate of change of individual hospital expenditures from 1975 to 1976 with that from 1976 to 1977 is only 0.06. Correlations for other variables are small and negative.

TABLE 3. CORRELATION BETWEEN PERCENTAGE CHANGE 1976-1977 AND PERCENTAGE CHANGE 1975-1976 IN EXPENDITURES, ADJUSTED ADMISSIONS, WAGE RATE, AND EXPENDITURES PER ADJUSTED ADMISSION[a]

Variable	Correlation Coefficient (r)
Total Hospital Expenditures	0.06
Adjusted Admissions	-0.01
Wage Rate	-0.28
Total Expenditures per Adjusted Admission	-0.13

SOURCE: CBO calculations using American Hospital Association Annual Hospital Surveys, 1975, 1976, 1977.

a. Excludes hospitals exempted by legislation on the basis of characteristics or state cost containment programs, and those with missing or unusual data.

Other standard microsimulation techniques were also inappropriate to the task at hand. Any type of probit analysis would have experienced the same problems as other types of regressions. Such techniques also would have resulted in the loss of important information. Simply estimating the probabilities of hospitals being over or under their guidelines would not have been sufficient, because the amount a hospital was over or under was also needed. Simple inflation equations were inappropriate because of the sensitivity of the final estimates to the distribution of rates of change. Simple inflation would have preserved the distribution of absolute levels at any point in time, but at the expense of eliminating any distribution of rates of change.

Instead, the aging process was based on an assumption that the behavior of individual members of the selected subset of community hospitals in 1972 through 1977 relative to the mean for the subset is an accurate predictor of the behavior of the same hospital population in 1978 through 1983. More explicitly, the shapes of the distributions of the aged variables relative to their means are assumed to be constant over time. Furthermore, the pattern of linkages between these distributions is assumed comparable in the historical and the simulated periods. While the simulated surveys probably do not forecast the behavior of any individual hospital accurately, they should reasonably represent the population of hospitals taken as a whole.

The assumption that the distribution of behavior of hospitals in the model during the 1972-1977 period would be representative of the behavior of the same group of hospitals for the 1978-1983 period is a potential problem. The existence of the Economic Stabilization Plan from mid-1971 to early-1974, and the hospital industry's "Voluntary Effort" to control hospital costs that began in December 1977, may have altered the shape of the distribution of hospital expenditure increases, raising doubts about this assumption. A sensitivity analysis (see Chapter IV) showed that moving the starting point by one year does not significantly affect the savings estimates, however.

CHAPTER IV. SAMPLE RESULTS AND SENSITIVITY ANALYSES

This chapter illustrates how the model was used to estimate aggregate savings for purchasers of hospital care, the distribution of savings among hospitals, and the sensitivity of these results to certain assumptions.[1]

SAVINGS TO PURCHASERS OF HOSPITAL CARE

The Guidelines

The average hospital not exempted by characteristics would have faced a guideline of approximately 16.5 percent in 1980 (see Table 4). About 73 percent of those hospitals would have met the guideline for hospitals in their states. About 28 percent of the hospitals would have met the guidelines in both 1980 and 1981, approximately 11 percent of the hospitals would have met the guidelines in 1980, 1981, and 1982, and some 2 percent of the hospitals would have met the guidelines in 1980, 1981, 1982, and 1983.

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1. Estimates presented here are for the Hospital Cost Containment Act of 1979 as ordered reported by the Senate Labor and Human Resources Committee. Since 1979 was over when the estimates were prepared, 1980 was treated as the first year hospitals would face guidelines and 1981 is the first year they could have come under revenue controls. The estimates are the last official CBO estimates provided to the Congress and are based on January 1980 CBO economic assumptions. To summarize the forecast from 1980 to 1985 used in these estimates (which is no longer the current CBO forecast), total hospital expenditures were projected to increase at an average annual rate of 16.0 percent, adjusted admissions at 1.5 percent, and the hospital market basket index at 10.3 percent.

TABLE 4. ESTIMATES OF AVERAGE PERCENTAGE GUIDELINES IN THE VOLUNTARY PROGRAM AND PERCENTAGE OF COMMUNITY HOSPITALS MEETING THEM, 1980-1983[a]

Year of Reporting Period	Unadjusted Guideline	Guideline Adjusted for Reporting Period	Hospitals Meeting Guideline[b] (percent)
1980	15.3	16.5	73
1981	14.2	14.2	28
1982	13.2	13.2	11
1983	12.4	12.4	2

a. Average guidelines are expenditure-weighted averages for all community hospitals not in states with mandatory hospital cost control programs and not exempted on the basis of characteristics.

b. This is the percentage of those hospitals not already exempted by characteristics or by the existence of a mandatory state program. For 1981, 1982, and 1983 this is the percentage meeting the guideline for two, three, and four years respectively.

The Revenue Limits

Hospitals that would have failed to meet their 1980 guideline would have faced an average limit on their 1981 inpatient revenue per admission increase of 11.4 percent (see Table 5). This includes an average 4.5 percentage point penalty for excessive expenditure increases during the base year (1980) and a net 0.3 percentage point penalty for excessive increases in admissions levels. The combined penalties would have declined substantially by 1985 to 0.6 percentage points. The reporting period adjustment, which allows hospitals to average part of their base-year

expenditure increases into their revenue limits, would have raised the limits by 2.9 percentage points in 1981 (from 8.5 percent to 11.4 percent) but would have been eliminated by 1985 because no hospitals were simulated to enter the mandatory phase of the program after 1984.

TABLE 5. ESTIMATES OF AVERAGE PERCENTAGE INPATIENT REVENUE LIMITS APPLIED TO HOSPITALS IN MANDATORY PROGRAM, 1981-1985[a]

Year of Reporting Period	Market Basket	Base-Period Adjustment	Admissions Adjustment	Unadjusted Limit[b]	Reporting Period-Adjusted Limit
1981	13.1	-4.5	-0.3	8.5	11.4
1982	11.6	-3.6	-0.1	7.9	10.7
1983	10.6	-2.4	0.1	8.3	9.0
1984	10.2	-1.2	0.0	9.1	9.3
1985	10.4	-0.6	0.0	9.8	9.8

a. Averages are for all hospitals subject to mandatory controls in that year and are weighted by allowed revenues in the previous reporting period.

b. Components may not sum to total because of rounding. The efficiency adjustment raises the unadjusted limit by 0.2 percentage points in 1981 but has no net effect thereafter.

Effects of the Limits on Revenue Growth. The controls on the hospitals failing to meet the guidelines would have had a substantial impact on the rate of growth of hospital revenues. For all community hospitals, the average annual rate of increase for 1980 to 1985 would have fallen from 16.0 percent to 13.4 percent (see Table 6).

TABLE 6. JANUARY 1980 ESTIMATES OF THE EFFECT OF COST CONTAINMENT ON TOTAL COMMUNITY HOSPITAL REVENUES IN FISCAL YEARS 1981-1985 (In billions of dollars)[a]

Fiscal Year	Revenues Under Current Policy		Revenues With Cost Containment		Effect of Cost Containment
	Revenues	Annual Increase (percent)	Revenues	Annual Increase (percent)	Savings
1979	66.8		66.8		
1980	76.6	14.7	76.6	14.7	0
1981	89.4	16.7	88.4	15.4	1.0
1982	104.0	16.3	100.6	13.8	3.4
1983	120.4	15.8	113.3	12.6	7.1
1984	139.2	15.6	127.5	12.5	11.7
1985	160.8	15.5	143.8	12.8	17.0
1981-1985	613.8	16.0	573.6	13.4	40.2

NOTE: Components may not add to totals because of rounding.

a. Revenues are on a cash accounting basis. Both inpatient and outpatient net revenues are included.

Federal outlays would have been reduced by a total of approximately $17 billion over the 1981-1985 period (see Table 7). The outlay reductions would have been much larger in later years than in 1981, when they would have been only about $0.4 billion. This pattern results from the phasing-in of revenue controls, the reporting-period adjustment for a hospital's first year under

revenue controls, and the fact that each year's cap would be applied to the revenues allowed by the bill the previous year rather than to the hospital's actual revenues the previous year.

TABLE 7. JANUARY 1980 ESTIMATES OF SAVINGS FROM THE HOSPITAL COST CONTAINMENT ACT OF 1979, 1981-1985 (In billions of dollars)

Fiscal Year	Federal Savings			Nonfederal Savings	Total
	Medicare	Medicaid	Total		
1981[a]	0.3	0.1	0.4	0.6	1.0
1982	1.2	0.2	1.4	2.1	3.4
1983	2.6	0.4	3.0	4.1	7.1
1984	4.4	0.6	5.0	6.7	11.7
1985	6.3	0.9	7.2	9.8	17.0
1981-1985[a]	14.8	2.2	17.0	23.2	40.2

NOTE: Components may not add to totals because of rounding.

a. Includes savings from 1980.

Savings to nonfederal payers (for example, private insurers and individuals) would have totaled $23.2 billion over the 1981-1985 period. The year-to-year pattern would have paralleled that for federal savings.

Distribution of Savings

The model indicated that the burden of the controls would probably not have been concentrated on any one type of hospital (see Table 8). Hospitals subject to controls would have been quite similar to those exempted, in terms of ownership, size, and

teaching status. Estimates indicate that the distribution of savings among types of hospitals would have been in rough proportion to the share of each type in total hospital expenditures.

TABLE 8. PERCENTAGES OF HOSPITALS AND REVENUE REDUCTIONS FROM COST CONTAINMENT, BY TYPE AND SIZE, 1981-1985

Category	Percentage of Hospitals		Revenue Reduction of Controlled Hospitals as Percentage of Total Expenditure in Their Categories[a]
	Controlled	Exempt	
Public (city-state)	99	1	9.1
Private, Nonprofit	98	2	9.2
Private, For-Profit	96	4	8.4
Number of Beds			
1-99	96	4	10.3
100-299	98	2	8.9
300-499	99	1	8.7
500 or more	100	0	9.7
Teaching	99	1	9.6
Nonteaching	98	2	8.7

NOTE: Estimates exclude hospitals in states with mandatory hospital cost containment programs and those exempted on the basis of characteristics.

a. Total expenditures based on current policy projection.

SENSITIVITY ANALYSES

This section analyzes the sensitivity of the savings estimates to three factors:

- o The aggregate hospital forecast;
- o The time period for the baseline hospital survey data; and
- o The assumption of no changes in hospital behavior in response to the program during the guideline phase.

Aggregate Hospital Forecast

Forecasting aggregate hospital expenditure increases is not a precise science. Errors of one or even two percentage points must be expected. Forecasting hospital expenditures is particularly difficult now. Increases in the intensity of hospital resources (i.e., the increase in real resources per admission) have slowed over the past two years, perhaps due to the hospital industry's Voluntary Effort to control hospital costs or to the threat of mandatory controls. The degree to which this decline in intensity growth will continue is difficult to predict.

Sensitivity analysis showed estimates of savings to be moderately affected by aggregate projections of hospital resource intensity (Table 9). For example, a one-percentage-point increase in the forecast for overall intensity growth would have increased fiscal year 1981 savings by roughly 50 percent and total savings over the 1981-1985 period by about 25 percent.[2] On the other hand, if actual hospital expenditures had increased less than forecast, savings could have fallen by a larger degree because that would have increased the probability of the national and state triggers not being pulled. On the other hand, when errors in the projected increases in both expenditures and the hospital market basket price index are of similar magnitude and direction, estimates of savings are affected only slightly.

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2. For ease in computation, a one-percentage-point forecasting difference for intensity was approximated by reducing each of the voluntary and mandatory caps by one percentage point before applying other adjustments.

TABLE 9. JANUARY 1980 ESTIMATES OF SAVINGS FROM THE HOSPITAL COST CONTAINMENT ACT OF 1979 UNDER ALTERNATIVE AGGREGATE HOSPITAL EXPENDITURE FORECASTS, 1981-1985 (In billions of dollars)

Fiscal Year	CBO Forecast		CBO Forecast with One-Percentage-Point Increase in Intensity	
	Federal Savings	Total Savings	Federal Savings	Total Savings
1981[a]	0.4	1.0	0.6	1.5
1982	1.4	3.4	1.8	4.6
1983	3.0	7.1	3.7	9.0
1984	5.0	11.7	6.1	14.5
1985	7.2	17.0	8.7	20.7
1981-1985	17.0	40.2	21.0	50.2

a. Includes savings from 1980.

Baseline Years

Results were not very sensitive to the specific years of survey data that were aged to represent the 1978-1983 period. Shifting the data base forward by one year, so that 1973 instead of 1972 was simulated to represent 1978, increased fiscal year 1981-1985 savings by only 1 percent. Fiscal year 1981 savings increased by 8 percent, but from a base that was so small that the difference was totally absorbed by rounding.

Hospital Behavior[3]

Results were sensitive to assumptions about hospital behavior during the guideline phase but not to assumptions about behavior during the mandatory control phase. The model assumed that hospitals would not alter their behavior in response to the controls except to comply with the revenue ceilings. This, of course, would not have been the case. Some hospitals that would have exceeded their guideline or mandatory revenue ceiling probably would have taken action to lower their costs, thereby increasing first-year savings, but decreasing future savings since fewer hospitals would have been controlled. Those expecting to be below the guideline might, despite the penalties contained in the bill, have taken actions to increase costs for that year in order to place themselves in a better position to meet the guideline the next year, thereby decreasing first-year savings. These actions might have included speeding up capital expenditures and hiring or stockpiling supplies.

For hospitals subject to revenue controls, the timing of revenue or expenditure increases would not affect the savings estimates because the revenue limits were applied to a constant base which was not updated. Furthermore, estimates of savings are not dependent on whether hospitals would cut costs or run deficits in order to comply with the revenue limits. Shifting services to outpatient departments or other gaming on the part of hospitals could lower savings, however.

HHS analysts, in their official estimates of the impact of the legislation, assumed that each hospital would reduce its rate of expenditure growth by one percentage point during the first year under the guidelines, and that those hospitals meeting their guidelines in that year would keep their expenditure growth within the guidelines thereafter. These assumptions roughly doubled first-year estimated savings and increased five-year estimated savings by about 30 percent. They were responsible for an important part of the difference between HHS and CBO estimates.

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3. Estimates of the sensitivity of savings estimates to alternative behavioral assumptions were made in 1979 using different economic assumptions and an older version of the simulation model than those discussed elsewhere in this paper.

CBO did not adopt these assumptions because, among other things, it was reasoned that if hospitals were to alter their behavior, most would do so in ways that would reduce, rather than increase, savings over the five-year period. It was considered likely that hospitals would change their behavior in response to the legislation in a manner that minimized their net revenue reduction, if they changed their behavior at all.

In order to further test the sensitivity of the estimates to changes in behavior, CBO developed the following set of what were felt to be reasonable alternative behavioral assumptions:

- Hospitals below their guidelines during the first year would increase expenditures by a maximum of two percentage points (but not so much as to exceed the guidelines).

- Hospitals above their guidelines whose long-term increases in admissions were less than their states' population growth plus one percentage point:

  -- would reduce expenditures to meet the guidelines if they were within two percentage points of their guidelines.

  -- would not change their behavior if they were more than two percentage points above their guidelines.

- Hospitals above their guidelines whose long-term increases in admissions were greater than their states' population growth plus one percentage point:

  -- would reduce expenditures so as to meet the guidelines if they were within one percentage point of their guidelines.

  -- would not change their behavior if they were more than one percentage point above their guidelines.

These assumptions about changes in behavior resulted in lower estimated savings than when no changes in behavior were assumed. They lowered five-year savings by about 20 percent. Using these assumptions, a small net increase in hospital expenditures (negative savings) during the first year under the guidelines was simulated, compared to no changes in expenditure levels during this period using the main assumptions. Savings for the first year under mandatory controls were simulated to decline about 55 percent.